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## Colloquium Brief: The Energy and Security Nexus: A Strategic Dilemma

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### A Partnership Between the U.S. Army War College, and the Triangle Institute for Security Studies

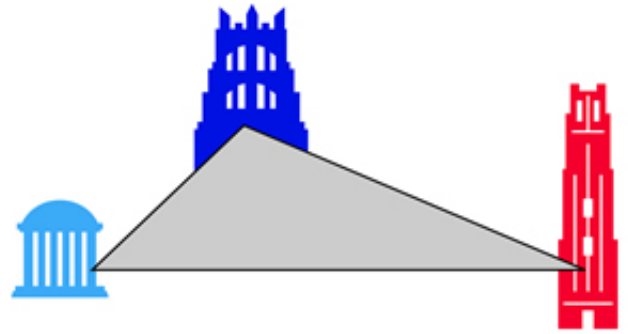
## Key Insights.

- The U.S. is relatively well placed when it comes to energy security (defined as security from shocks in prices). We are finding more fossil fuels — especially natural gas — and are otherwise buffered from disaster by advantages ranging from the existence of strategic reserves to market mechanisms that plug gaps in our supply.
- In the future, we have less to fear from diminishing supply than from rising demand, especially in rapidly industrializing countries.
- The U.S. should engage in a policy of strategic restraint in the Middle East: military force is not the best instrument to use in securing energy supplies. However, the U.S. Armed Forces can increase energy efficiency, provided this does not undermine the effectiveness of its

fighting forces.

- Fossil fuels will play a major role in meeting energy needs for many decades to come because they are energy-dense, cost-effective, and supported by an existing infrastructure. In addition, new technologies take a long time to develop.
- That said, the pursuit of alternative energy is logical. Reducing reliance on foreign imports will ease trade imbalances. Ending the reign of oil as a strategic commodity will provide opportunities for poorer nations to compete in the energy market, encourage reforms in oil-rich countries, and undermine support for extremists who depend on petrodollars. Having domestic alternatives will ensure that a good supply of fossil fuels (the perfect fuel) is available to support our Armed Forces on the war-front, and help to limit climate change with its attendant security problems.
- To promote alternative energy, we must find the right way to frame the argument. To change public behavior we should make the use and production of alternative energy sources more economically attractive by taxing externalities, subsidies, enforcing fuel standards, or harnessing market forces (fuel agnostic cars).
- Among our fuel choices, none is zero-cost. Almost all our fuel choices threaten water supplies via diversion or contamination. Some fuels threaten the environment, some threaten our standard of living, and some have foreign policy costs. Furthermore, many of the links between fuel choices and security are not clearly established. Thus, U.S. biofuels development may or may not have caused the sharp rise in world food prices and may or may not be environmentally sustainable. Also, more research needs to be done on the cyber-vulnerabilities that might spring from the development of the smart grid.
- Nuclear power carries risks both at the human security level (environmental damage) and at the national security level (proliferation and radiological attacks). It also holds promise as a clean, steady (and maybe ultimately affordable) source of power. Countries that rely on civilian nuclear power may actually be deterred from pursuit of a nuclear weapons program. Keeping the U.S. as a player in the nuclear power field might also make strategic sense as it will enable us to nudge the world community away from technologies that might present a greater proliferation risk.

On March 3-4, 2011, the Triangle Institute for Security Studies, North Carolina State University, and the Strategic Studies Institute held a colloquium at the McKimmon Center in Raleigh. The event received additional financial support from the Research Triangle Energy Consortium, the Oak Ridge National Laboratory-North Carolina State University Collaborative Research Program, and Duke



University's Program in American Grand Strategy. The colloquium, entitled "The Energy and Security Nexus: A Strategic Dilemma," was attended by 128 persons from Federal and state government, academia, think tanks, and a wide variety of local organizations and businesses working on energy issues. The goal of this conference was to explore the connections between energy and security (human, national, and collective) and to consider how best to resolve strategic dilemmas.

In his keynote address, **Alan Hegburg**, Energy and Security Program, Center for Strategic and International Studies, provided an essentially optimistic view of U.S. energy security. Future oil embargos are both unlikely and not much of a threat as there are mechanisms in place to deal with them. These mechanisms range from oil-sharing arrangements to strategic reserves. Our major oil and natural gas importer is Canada and, since deregulation began under President Carter in the 1980s, prices have been set by the spot and forward markets and we have become more energy efficient. Given concerns over CO<sub>2</sub> emissions and climate change, it would make sense to back out of heavy duty coal use and add renewable energy to the fuel mix over time. Natural gas, however, is likely to be the major boom area of the future. The U.S. has substantial natural gas reserves which can be exploited if we solve problems associated with hydraulic fracturing and competition over water. Other parts of the world are also more energy secure than they have been in the past. Because our refineries are configured to handle a wide range of crudes, the U.S. no longer drives up prices on the international market by overpaying for more refined oils. Natural gas prices are low in Europe as well as the U.S. Also, once the Panama Canal joins together the Atlantic and Pacific markets, we may see an end to the existing gas-to-oil indexation and a corresponding increase in healthier competition.

In the discussion period that followed, the audience raised a number of concerns, many of which were revisited later in the conference. While questions were raised about whether or not we have reached peak oil production and if it would be wise to use strategic oil reserves to hold prices

steady, the audience did not contest the basic assumption that the U.S. is relatively energy secure for now.

The first panel fleshed out the relationships between fossil fuels and security. **Anne Korin**, Institute for the Analysis of Global Security, suggested that we can improve our security posture by ending the status of oil as a strategic commodity. Oil, she said, shapes relations among countries and creates security vulnerabilities, chief among them is the promotion of radical Islam (funded by oil wealth). Oil is a strategic commodity due to its virtual monopoly over transportation fuel and because oil is controlled by the OPEC cartel. We can end this monopoly if we put other fuels into competition with oil on the vehicle platform.

**Eugene Gholz**, Center for Energy Security, University of Texas at Austin, focused on how to simultaneously protect the prize (oil) and our national security. This can be done by a policy of strategic restraint. Contrary to popular belief, our energy supplies are not overly vulnerable to political/military disruptions. Thanks to market forces (and cheating cartel members) faucets typically go on in one country if they go off in another. Internal instability in oil-producing countries is the one scenario that could cause the U.S. some problems, but the military is not well-suited for dealing with this kind of problem. We should pull back to an over the horizon posture in the Middle East and engage in a policy of strategic restraint.

**Kevin Book**, ClearView Energy Partners, stressed the need to diversify and conserve energy as a security measure. As he noted, this will free up high-density oil needed on the battlefield. He also addressed concerns over hydrocarbon combustion. We use coal because we are a market economy and it is cheap, but we are trying to move away from it because of its impact on climate change. Developing nations do not have that luxury. We cannot stop them from using coal, but we can provide them with the kind of infrastructure that will help them implement green technology over time. Carbon storage also offers interesting possibilities. While some advocate using carbon-capture technologies to enhance oil production, a better idea is to use it in building materials.

**Rosemary Kelanic**, Harvard University, remarked on how differently the various speakers had interpreted what we meant by energy security. She teased out the security dilemmas, noting for example, that one factor that prevents the U.S. from weaning ourselves away from coal is the desire for cheap fuel (which some see as a key to energy security). But this reliance on coal reduces our ability to address climate change, which poses security threats of a different kind.

In the discussion that followed, two issues dominated: Might flexi-fuel vehicles provide a solution for our dependence on oil? And what would happen if the U.S. did less to protect oil supplies? Would, for example, the U.S. presence as a “policeman” be missed and would China be tempted to fill the vacuum?

The second panel focused on nuclear and water power. **Steven Miller**, International Security Program, Harvard, noted that the use of nuclear power promises to alleviate some security problems. For example, it does not generate greenhouse gases which lead to global warming. At the same time it raises other more immediate security concerns. Thus we will have to secure nuclear installations from terrorism (and at manageable cost), and we will have to make intelligent fuel cycle choices (the enrichment of nuclear fuel at the front end and the reprocessing of spent fuel at the back end) if we are to avoid proliferation.

**Man-Sung Yim**, Nuclear Engineering, North Carolina State University, in contrast, proposed that a country genuinely interested in building a successful commercial nuclear program might be deterred from developing a weapons program. Should it show an interest in developing a nuclear military capability, it would be subject to international condemnation and actions that would cripple its chances of achieving its nuclear power goals.

**James Bartis**, RAND, drew attention to the possibility that, should the U.S. fail to join the nuclear renaissance, it might be less well positioned in the future to combat proliferation and discourage the use of risky reprocessing technologies. He also noted that the military is looking into renewable energy as a way to supplement power on military installations and is interested in modular reactors for forward deployment.



Photo by Y. Wilson: Kelanic, King, and Cekuta discuss issues raised by their panels.

**Carey King**, Center for International Energy and Environmental Policy at the University of Texas at Austin, addressed the complex nexus between energy, water, and security. Sometimes water is diverted to produce energy as in the case of hydropower, hydraulic fracturing, irrigation of biofuels, or power plant cooling. Sometimes — as in the case of carbon sequestration — water may be contaminated. Human security is threatened to the degree that these technologies are deployed in regions where rainfall is limited and population is high. Energy security is also threatened to the degree that these supplies will be at risk in times of drought. Energy is also needed to clean (desalinate) and distribute water.

Questioned by **Alex Roland**, Department of History, Duke University, the panelists further explored the meaning of security. They agreed that damage to the environment is a security threat: water diversion can lead to conflict and internal instability, pollution and waste disposal problems lead to health problems and a decline in human security. They evaluated the relative risk of different kinds of technologies and agreed that our greatest security nightmare continues to be nuclear assets in the context of internal instability. They differed as to how much we have to fear from accidents and whether or not the spread of nuclear power is likely to become a significant factor in the spread of weapons technologies. They also debated what drives our energy choices: perceived economic self-interest or consideration of the wider good. In the question and answer session that followed, a number of concerns were raised. Does the U.S. have different policies toward hostile and friendly nuclear proliferators? (Yes). Do countries seek nuclear power for economic or political reasons? (Both). Is our nuclear waste problem a technological one, a public relations one, or a political one? (All of the above). Finally, how do we deploy alternative technologies in the poor world? (By setting an example and by helping those countries meet their basic needs).

The third panel focused on other alternative energy sources, specifically biofuels, cellulosics, wind, and solar power. **James Trainham**, Research Triangle Solar Fuels Institute, asked a number of leading questions of the panelists. What is the real cost of our existing energy infrastructure? Should the price of energy reflect hidden military costs (such as the cost of defending our oil interests) or hidden social costs (such as the cost of compensating for injury and sickness caused by the coal industry). According to **Michael Roberts**, Department of Agriculture and Resource Economics, North Carolina State University, economists are already attempting to quantify externalities, both positive and negative. **James Bartis** and **David Dayton**, Research Triangle International, concurred, stressing in particular the need to factor infrastructure into the calculations. **Daniel Weiss**, Center for American Progress, focused on social costs, noting that the



Photo by Y. Wilson: Rao discussing key panel issues with a representative from an industrial biotechnology company.

U.S. spends \$120 billion a year in additional healthcare costs due to premature deaths, lost productivity, and hospital visits that stem from our use of fossil fuels.

Can alternative energy help provide the U.S. with energy security or otherwise address national and international security concerns? Bartis was cautious here, noting that while there are some interesting new biomass technologies (algae in particular), current and near-term biomass systems are likely at best to replace 10 or 15 percent of our petroleum consumption. Alternatives can go only so far in meeting our energy needs. Weiss by contrast, stressed the importance of alternatives as a way to deal with global warming, a significant security threat multiplier. Roberts reinforced this

point, noting that climate change will seriously reduce U.S. crop yields. At the same time, he warned of the negative security ramifications of biofuels production. When land is cleared, greenhouse gasses are emitted. Moreover, by devoting an extensive portion of our arable land (currently 1/3) to biofuels production, we have already caused a sharp rise in world grain prices. These price increases may seem negligible to us but are life threatening to the poor peoples of the world and arguably contributed to recent unrest in the Middle East.

Trainham then steered the conversation toward solutions. Fossil fuel suppliers make sure the oil spigots are opened just enough to stop the American public and others from making a serious attempt to switch over to alternative energy. So what can we do to promote its use? Among the incentives suggested by panelists were taxes, subsidies, and funding for research and development.

The general discussion that followed revealed some fault lines in our current thinking about energy. Are price increases linked to the development of ethanol, to rising meat consumption — which requires more energy intensive agriculture — or to oil price speculation? How much of the

world's corn and other grain production is used for ethanol production as opposed to animal feed? The audience also showed interest in how to create incentives and suggested, among other things, that we should follow the Brazilian example and develop a flex-fuel vehicle fleet.

On the fourth panel, speakers considered how U.S. energy security is affected by the international security environment. **Bernard Cole**, National Defense University, noted that the rise of major energy-hungry powers has obvious strategic implications. Among these are the increased maritime interests of China and Brazil and competition between India and China for energy resources. He did not think that the search for energy would pose a direct military threat to the United States, though the rise of Asian powers would limit its hegemony. Nor did he think Chinese expansion of nuclear power marked a break from its traditional policy of minimal nuclear deterrence. He did point out that China's continued heavy reliance on fossil fuels will affect international efforts to deal with climate change.

**Robert Cekuta**, Department of State, followed with an assessment of the threats — unconventional as well as conventional — to the stable supply of energy. He saw most of these threats as manageable. International instability, corruption, and lack of needed competence do indeed slow down resource development but can be solved by increased transparency and good governance. Terrorism so far has inflicted only a finite amount of damage, which has been able to be repaired relatively quickly. Piracy has not actually affected the flow of oil, but fighting piracy is an area where governments are increasingly focusing efforts, including stopping the ability of pirates to use the international financial system. Supply, he concluded, was in general not the real danger. Rather, the issue was increasing demand, especially in places with a large appetite for energy like China, India, and Africa.

By contrast, **John Bumgarner**, U.S. Cyber Consequences Unit, expressed serious concern over the vulnerabilities of U.S. domestic electricity supplies. Major dams and large power generators are computerized and susceptible to cyber attacks. Replacing damaged parts of our critical infrastructure, moreover, are complicated by the fact that many devices are no longer made in the U.S. Bumgarner also discussed important challenges that are likely to arise as we develop smart grids. Electric, gas, and water meters have computerized processes embedded in them and can be hacked. A cyber attack that could shut down electricity during the summer months in a southern city like Raleigh, North Carolina, would cause more than discomfort. We face a number of additional challenges ranging from how to dispose of equipment that contains toxic materials to how to secure our privacy.

**Stephen Kelly**, Duke University, concluded by stressing U.S. advantages. About 22 percent of the oil we currently import comes from Canada. Canada is close by and is a long-term ally unlikely to face the kind of internal threats that might limit supply. Existing pipelines are pretty good and the Keystone Alberta-to-Port Arthur pipeline, if built, would be state of the art. Mexico, though problem-ridden, is our second largest oil supplier and also a close neighbor. Finally, we produce 90 percent of the natural gas we need at home.

In the general discussion that followed, interest was shown in how to create an environment conducive to helping oil flow in oil-producing countries. Both governments and oil companies are now involved in this process. Concerns over China were raised, particularly regarding its stake in a rare earth mine in the U.S. (critical for defense applications). The most protracted discussion was over cyber threats, especially those that, like the Stuxnet worm, are capable of targeting nuclear facilities. According to Bumgarner, U.S. nuclear power systems are probably not adequately protected from cyber attacks. He also stressed that tech-savvy terrorists are already looking into developing cyber capabilities: critical infrastructure attacks are discussed on jihadist forums.

The last session of the conference focused on potential solutions. There were no formal presentations: ideas were solicited from the audience by **Vikram Rao**, Research Triangle Energy Consortium. **Douglas Lovelace**, Strategic Studies Institute, and **William Boettcher**, Department of Political Science, North Carolina State University, provided a political and military perspective and offered some concluding insights.

First, does the U.S. have a significant energy security problem? Conference attendees generally agreed that the

U.S. is less vulnerable to price spikes or long-term price increases in fossil fuels than many think, but that diversifying our energy sources is nonetheless functional, some would say vital. Several attendees did think that rising demand might be a game changer.



Photo by Y. Wilson: Dayton and Weiss analyze costs for alternate energy sources.

Second, inasmuch as we have an energy security problem, what are the solutions? Audience members agreed that there are no military solutions to the rising competition for energy. The U.S. Armed Forces could however, reduce their energy consumption, especially if, as looks likely, the U.S. shifts its emphasis away from large, costly, energy-burning land forces. Does the answer lie in the development of alternative energy? Conference attendees widely recognized its value as a way of keeping fossil fuel prices in check, liberating our foreign policy, and preparing for a less certain future.

Third, would the development of alternative energy help us meet other national and international security goals? Would it give us greater financial security? Some said, no alternative fuels are too costly, while others said, yes, by ending oil imports we could end our trade imbalance. Could alternative energy enhance the effectiveness of the military? Probably not — oil is the optimal fuel for the battlespace. Would it improve collective security and stability? Perhaps. If oil's place were undermined as a strategic commodity, developing countries could enter the liquid fuel market. Moreover, the resource curse would be broken — we would not feel the need to support regimes that control oil reserves, and corrupt governments would no longer have the revenues to buy political support at home. However, specific technologies can cause collective security problems like the hunger caused by the diversion of food for fuel.

If alternative energy is a solution to our problem, how do we foster interest in it? Are political solutions possible in the current rancorous political climate? Does public advocacy work? If so, how should we frame the issues? Can you get civilians to take an interest in the security ramifications of their fuel choices, or are they only interested in prices at the pump? Opinion on all these issues was divided, though there was a widespread conviction that personal economic considerations among the public trumped security concerns. To level the playing field with oil, some conference attendees pushed the idea of taxes and tax credits, others pushed the idea of government fuel standards, yet others favored adopting cars that could run on a wide range of liquid fuels.

In closing, Lovelace noted that the conference provided useful technical information for those who worked in national security strategy and national security policy, and gave a good foundation for understanding many energy issues, especially energy security. William Boettcher was most struck by the multidimensional characteristics of the issues and the absence of zero-cost solutions.

He ended on an optimistic note, however, claiming that we construct our political reality and therefore we can change it. The final word went to Vikram Rao who stressed again how important natural gas would be in securing our energy future.

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